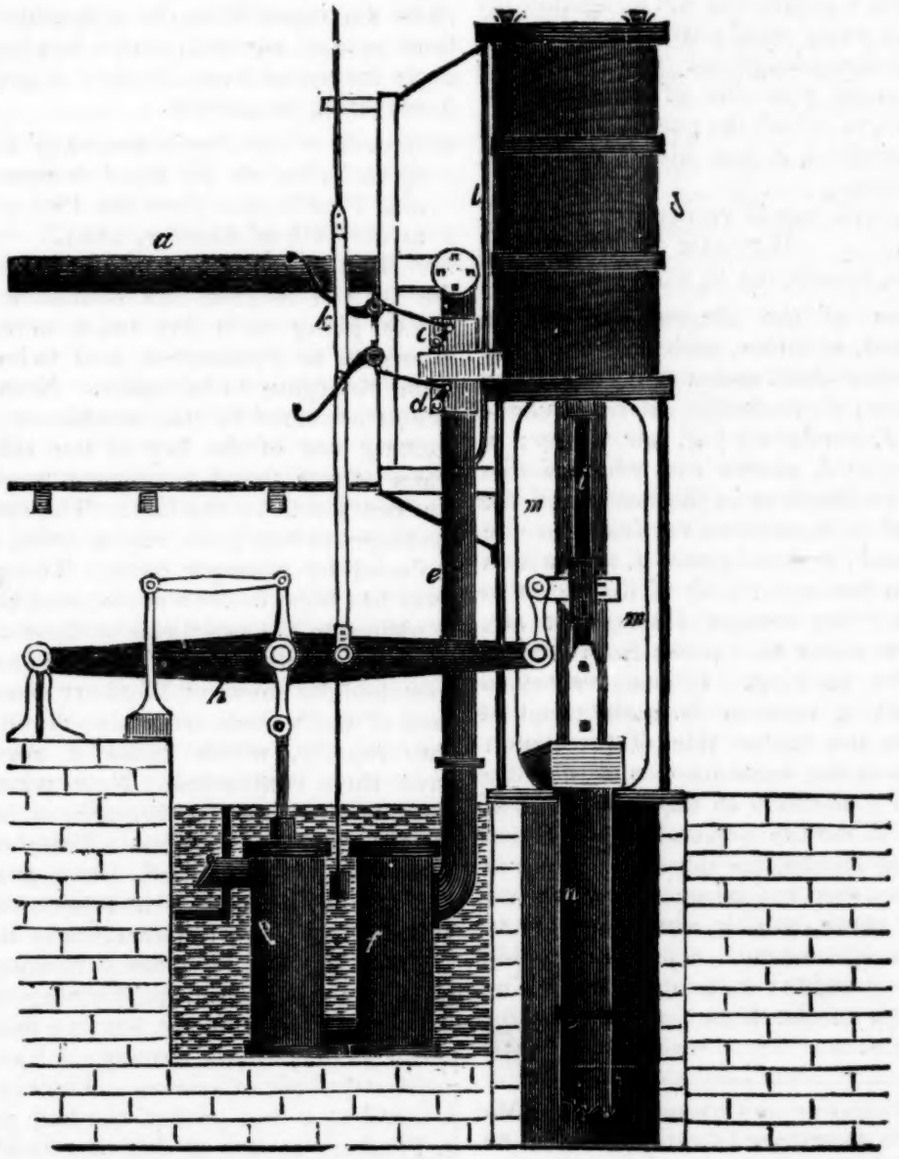
MECHANICS' MAGAZINE,

AND

REGISTER OF INVENTIONS AND IMPROVEMENTS.

VOLUME IV.] FOR THE WEEK ENDING DECEMBER 20, 1834. [NUMBER 6.

SYMINGTON'S LIFTING STEAM ENGINE.



[From the London Mechanics' Magazine.]

SIR,—I send for your inspection the accompanying drawing and description of my father's improved lifting steam engine, patented in 1801: an engine which admirably fulfilled the purpose of its inventor, and possessed many advantages over those even at present generally employed.

With what ease its principle can be rendered effective for the propulsion of vessels, an examination of the plate annexed to Mr. Bowie's pamphlet will render evident.

It may not be out of place here to remark, that the getting rid of the beam, a heavy, cumbersome, and unwieldy appendage, has been considered desirable. Such a desideratum this engine presents, the only thing connected with it at all approximating to a

beam, being the lever employed for working the air pump.

Several of these engines were constructed by my father, and I am credibly informed that one on the same principle, as far as regards the mode of communicating the power of the engine, without the intervention of a beam, has been erected at Broken Wharf, a place to which the water-works were removed prior to the taking down of old London bridge, the engineer having obtained information respecting the engine, and also a drawing, from a gentleman not altogether ignorant of its component parts.

If any acknowledgment was made to whom the merit was due of effecting the improvement, of which the parties concerned availed themselves, it has hitherto escaped my observation.

I am, sir, with much respect, your obedient servant, WILLIAM SYMINGTON.

1, Mary street, Bromley, Oct. 15, 1833.

Description of the Engraving.—a, the steam pipe; *b*, cylinder, which is closed at top; *c*, valve to admit steam from the boiler to the cylinder; *d*, discharge valve; *e*, eduction pipe; *f*, condenser; *g*, air pump; *h*, air pump lever; *i*, piston rod, which works through a stuffing-box in the bottom of the cylinder, and is connected vertically to the mine pump-rod; *k*, hand-gear; *l*, pipe which conveys from the upper side of the piston to the condenser any escape of steam or air, which may at times take place from imperfection of the packing. It is necessary to observe, that a vacuum is maintained at all times on the upper side of the piston equal to that in the condenser, and that the steam is only admitted to the under side of the piston. When the engine has performed the ascending stroke, the descending one is made in vacuo, thus requiring only two valves in place of three, which are necessary in Mr. Watt's single engine. *m m*, frame which supports the cylinder; *n*, mine pump. The representation of the boiler is omitted for want of space.

STEAM CARRIAGES ON COMMON ROADS.—We are pleased to record the following, having, as we do, great faith in the successful application of steam to road carriages.

The New-Bedford Gazette states, that a project is on foot for the construction of a road from that town, through Taunton, to Boston, for the purpose of being used for steam carriages; and a series of letters from Robert Mills, Esq., the projector, is commenced in that paper on the subject. The advantages of this description of locomotive travel, over that upon a railroad, are urged with great earnestness and considerable plausibility.

Mr. W. Hancock's Steam Carriages.

[From the London Mechanics' Magazine.]

Annexed is an engraving* of Mr. Hancock's new steam carriage, the Era, which has been plying for these several weeks past along with our old acquaintance the Autopsy, between the city and Paddington. It is by far the best which Mr. Hancock has yet constructed; extremely compact, elegant, and efficient. We subjoin an authentic, and at the same time very candid and honest, statement of the performances of both of these carriages since the commencement of their present running, which has been obligingly furnished to us by their ingenious and persevering proprietor.

Statement of the Performances of the Autopsy and Era, on the Road between London and Paddington, from the 18th of August to the 11th of October, 1834.

The Autopsy commenced running on the 18th of August, and continued about a month, going each day twice to and from Moorgate to Paddington, and twice to and from Moorgate to Islington. Nothing particular occurred to the machinery save the shaking out of the key of the side valve, when it was found necessary to draw the Autopsy home by the Era. The eyes of the carriage springs gave way a little, but were replaced by stronger ones. The principal wear has been in the wheels; and this chiefly owing to the smallness of their diameter, when encountering the deep holes in the wretched pavement of Finsbury square. The tires of the wheels were also found to elongate rapidly, which made it requisite to have them contracted. New wheels have just been put on this carriage, of larger diameter and thicker tires. The boiler has been carefully examined, but not the least perceptible difference has been detected. The fireplace, too, remains nearly the same.

The Era has now been running rather more than a month, performing the same distance as the Autopsy, but in a manner superior to that of any carriage I have either previously built or known. The crank shaft severed at a bad part of the bad pavement in Finsbury square a day or two after she commenced running, but this was replaced, and the carriage started the next morning at the usual hour, and has ever since continued at work, with the omission of only one journey, arising from the extension of an unsound place in the casting of the wheel flange.

---

* The engraving here referred to is omitted. The Autopsy, which is very similar, may be found in Vol. 3, page 137, of this Magazine.

I find on this hard road the wheels are severely tried; but this road, hard as it is, has been of inestimable value to me in regard to experience, pointing out with unerring certainty where more strength is wanting. The Stratford road, for instance, would have completely deceived me with regard to wear and tear of wheels. I should estimate the tear and wear on the former at double that of the latter; but then it should be borne in mind, the Macadamised part from King's to Tottenham court road is in a very bad state. I would advise all parties interested to keep this fact in view. They must bring their vehicles to a similar test before they can conclude experiments having for their object the means of arriving at a just estimate. On level and smooth roads a great display may be made, but such trials are fallacious and deceptive.

I forget to mention that some times, when I have had to take up a passenger on a bad piece of pavement, if the propelling wheels chanced to stop in a hole, the friction on the (perhaps only two) stones has not been sufficient to start the carriage, but by reversing the motion of the slide valves, and backing a few feet, (just as you would with horses,) the carriage is at once propelled forwards. But we may surely hope that some day or other the great public thoroughfares will not be suffered to remain in holes.

The consumption of coke has hitherto been from 8 to 12 lbs. a mile, and about 100 lbs. of water for the same distance.

We have up to this time carried nearly 4000 passengers in perfect safety, and I am happy to say, that the Jehus of the road get more friendly and reconciled to us; and as it is my intention to employ steady coach drivers as steersmen, the sooner this feeling is fully developed the better. Why should there be the least ill-will? What difference can it make, whether they drive horses, or

"Sweep o'er the hills in the glory of steam?"

I intend next week to advance another step, and to go one journey more each day. I have been blamed for not doing this sooner, but others may do as they please. I am content to move slowly, so that I continue to move well, although it may be at the expense of a little "ignorant impatience" on one side, or the want of "absolute wisdom" on the other. W. Hancock.

We add a description of the progress Mr. H. has made, and the difficulties he has had to encounter, from an intelligent correspondent of the Repertory of Patent Inventions.—[Ed.]

To the Editor, &c.*

Sir,—Any unprejudiced person, particularly if a lover of science, and having any regard for the welfare of his country, can but view with satisfaction and pleasure the performance of Mr. Walter Hancock's steam carriages, now running between London and Paddington; and no doubt Mr. H. must feel highly gratified at having, after a toil of *eight years*, brought to perfection and public approval these self-acting machines.

If the subject was one of mere show, or idle speculation, instead of actual national benefit, we could but admire his zeal for the completion of his object, and his determined spirit, amidst all the oppositions and difficulties thrown in his way to embarrass his laudable career.

The pretenders to science have, on paper, written that to be impossible which the head and the hands of Walter Hancock have given denial to, in a less perishable form.

Following the great Bacon of old, he has preferred actual experiment to doubtful theory, and thus progressing has accomplished his work. I have watched his *labors year by year*, and know that any reward which may now await him cannot be too great for them.

At the first proposal of steam locomotion on common roads, the tone of the public mind did not harmonize with it; indeed, to the present moment there are men, with the knowledge that carriages are actually running, who affect to doubt even its practicability; and what may appear equally strange, is the fact that eminent engineers, who formerly entertained similar opinions, are now actually (if I may borrow the phrase) *compiling* a carriage from the experimental materials furnished by the labor and at the cost of those they would have had the world despise. They have escaped the insults and the scoff and ridicule of their leaders, and are now for sliding in to share their merits and emoluments.†

The greatest and the most dreaded obstacle was that of ascending hills. Calculations upon traction have been made, and devices have been planned, by mechanics, to overcome this visionary impediment; but they may now regret the loss of their la-

* We have great pleasure in giving insertion to this communication. Making some allowance for the enthusiastic feeling expressed, we agree with the writer, that Mr. Hancock deserves great credit for his perseverance and talent, and we heartily wish him success.—Ed.

† "This circumstance is not fairly stated," says the editor of the Repertory of Patent Inventions, and he adds his explanation of the affair, exculpating several scientific men from the charge of borrowing Mr. Hancock's plans, which would not at all interest our readers.—Ed. M M.

bors, as by the power contained within the carriages themselves, (and not by additional, costly, and cumbersome mechanical appendages,) they may daily see the "Infant," the "Autopsy," or the "Era," loaded with passengers, ascending the badly kept road of Pentonville hill.

It is worthy of remark, that the beautiful and commodious carriage, the "Era," was not expected to ascend that hill at a greater speed than six miles, but it generally performs at the rate of eight miles in its worst, and ten miles in its better parts, whilst on the level road it will maintain 16 miles per hour.

As a proof of its power, a few days back a small pin dropped out of some of the machinery of the "Autopsy," by which it was brought to a stand; the "Era" was fetched out, and with great ease towed the "Autopsy" (whose weight is supposed to be three and a half tons) to the station in the City Road, performing up Pentonville hill at the rate of five miles per hour.

Mr. Hancock commenced his experiments in the year 1826, by constructing the carriage now called the "Infant," but the form and arrangement of the machinery of it were then very different to what they now are. Mr. H. frequently run it out in the neighborhood of his factory, at Stratford, and, on each return, minutely examined its works, and discovering their defects, either altered and improved those already in use, or invented and substituted parts to replace them.

In constructing his boiler, he first tried various combinations of tubes, a mode which in theory appeared to possess advantages, and had been the favorite one of several engineers, yet in practice: being dissatisfied with every modification of tubes, he gave them up. Having, however, by this practice, discovered the *requisites* of a boiler adapted for steam locomotion, he set his inventive mind to work, and the result was his present boiler, which consists of a series of thin parallel chambers, placed vertically, with narrow spaces between each chamber for the play of the fire: the chambers are, by a singular and very effective contrivance, all connected with each other near the top and bottom, and are prevented distending by a number of vertical bars placed up between them, or by projecting hemispheres in the side of each chamber, and the whole tied together by immensely strong bolts and braces.

After securing his invention by a patent, and now possessing the grand stamina of a steam carriage, namely, a boiler which is cheap in its construction, of little weight, not subject to leakage, an economist of fuel, and which generates dry steam very rapidly, he continued his experimental trips with greater confidence and increased expectations of ultimate success; and by the year 1831, after having spent five years of the prime of life in unwearied application, and most likely expended as many thousand pounds, not one farthing of which had been supplied from any public source, he found himself in a situation to offer his invention to his country; this was to him a most unpleasant task, for throughout his experimental career, with the exception of his private circle of friends, no individual was ever less supported; he was sneered at by the pretenders to science, derided by the press, and pitied by the benevolent as a mechanical enthusiast,—these were his fireside comforts; when out, insulted,—and in his way impeded by coach masters, or their men, by horse dealers, corn dealers, and all who conceived their interests in jeopardy, although at the same time they all declared steam coaches never could be brought into use. This appears somewhat paradoxical, but the perversion in the minds of some men cannot be accounted for.

The first company formed to run his coaches was the Brighton; for this company he built the "Era," (not the one now running to Paddington:) with the exception of a few trial trips, twice to Windsor, &c. it has never worked, I believe, and is now waiting the determination of the proprietors.

In the year 1832 the Paddington company was formed, and a carriage to be called the "Demonstration," afterwards altered to the "Enterprise," was finished, and run the London and Paddington road for sixteen successive days, on hire, in the months of April and May, 1833. Mr. Hancock having performed this part of his contract with the company, delivered the carriage to them, and was for proceeding, without further delay, to execute the two others, according to agreement; instead of which the "Enterprise" has now been kept shut up 16 months. During all this time, an engineer, who has his friends amongst the company, has been building one on the same premises where the "Enterprise" stands, and which has for all this long period filled the honorable post of dumb instructor.

The treatment which Mr. Hancock had now received, after seven years' exertions, would have induced many men to abandon their object altogether as an unlucky one; but not so with him: instead of following and submitting to the caprices and treatment of this company, he determined to build for

himself, and has now two carriages of his own, running on his own account, on the same road.

Like the gardener in the fable, he did not stop to repine at his loss; but without delay, and with increased energy, set to work again. Since the "Enterprise," he has built the "Autopsy," refitted the "Infant," built the new "Era," and has nearly completed another carriage not yet named, and has built a steam-drag for Mr. Voigtlander, of Vienna, which was shipped last July.

The "Infant" was the first steam carriage that passed through the city by steam, or that ever was at Brighton; it ran there, from Stratford, twice during the autumn of 1832.

The "Autopsy" also steamed through the city in the middle of the day, on its return from Brighton, on the 10th of October, 1833.

In November, 1833, the "Autopsy" ran for three weeks, on hire, between Finsbury square and Pentonville; but as it divided Mr. Hancock's attention from his carriages then in progress at Stratford, he withdrew it.

Since then, Mr. H. has fitted up a station on the City Road, and made the necessary arrangements for a supply of water; and from here his carriages first commenced their now regular run from the city to Paddington and back, on Monday morning, the 18th of August last, and have now been running daily more than two months, and conveyed upwards of 4000 passengers at the usual omnibus fare of sixpence each. Steam carriages have some claim upon the attention of the political economist, especially when it can be proved that they will afford an accession of manual labor far above that of the present system.

The only drawbackupon manual labor, in a general view, would be in the repairs of roads, for as steam carriages run with a wide flat tire, they will consolidate and improve a road, whilst the narrow tires of our present coaches, but, above all, the ploughing up and battering by the horses' feet, quickly deteriorate it.

The accidents and loss of life so frequently occurring, by the horses of stage coaches becoming unmanageable, will be avoided by the adoption of steam carriages, for it is impossible for any thing to be under a more perfect control; they are to be steered with the greatest ease and precision, and stopped or started instantaneously at pleasure.

During Mr. Hancock's experimental progress, nothing annoyed him more than the magnitude and consequence attached to any trifling failure, and which is generally allowed to be incident to any new mechanical invention. It has either been from enmity to, or jealousy of, a clever, persevering or plain-dealing, single-handed man; or those who have made so much of these matters have acted in ignorance or forgetfulness, that the present stage coaches in this country, the race of horses by which they are drawn, with their harness, and equipments, have been the work of ages—have engaged the attention of thousands of heads—at the cost of hundreds of thousands of pounds.

Does any one doubt what travelling probably once was in this country, let him travel others, let him visit almost the whole continent of civilized Europe, and I wish him safe back to England, however jolted and shaken, to hail it with pleasure and gratitude, as the hot-bed of genius and invention.

At the present day, it is not an unusual circumstance for a stage coach to have a trace broken or a splinter bar fail, but let an infant steam carriage stop upon the road, although its damage is no greater, and repaired in equal time, it would be published as a complete failure.

Should any theories of strength, and stress, and proportions, &c. of steam carriages be published hereafter, let it be remembered that they have followed, not preceded, the practice.

There are many difficulties attendant upon land steam locomotion, compared with fixed steam machinery or marine steam locomotion; for in many parts of these, either weight or bulk is of little more consequence than cost of material; if a boiler is not powerful enough, make another plentifully capacious; if a frame or a shaft is to be constructed, never mind how strong it is made, so that it is strong enough; but in a road steam carriage, the great puzzle has been to get a powerful boiler in a small compass and of little weight, to have all parts of the machinery and framing strong enough, not too strong; in fact, it is that every ounce is an encumbrance and a dead weight upon the wheels, and requires its ounce worth of power to move it; to perform this, larger and consequently heavier machinery is required, which again adds weight upon the wheels, and a consequent enlargement of power is again required.

Giving this due attention, it will be seen, that by no ordinary arrangement, or such as is applied to any present fixed machinery or marine locomotion, can a steam carriage work with any effect; in the first, neither space nor weight are of consequence; in the second, space may be considered more

than weight, but in a steam carriage space is very limited, and weight is of every consequence, because it is all dead upon its own resources; in fact, a road steam carriage, on a level, but particularly up hill, is a perfect self-acting machine; a steam vessel is not so, because the path of its progress is in itself buoyant.

In conclusion, I hope that when the "Infant" has run its course,—and, long as it may be, that day will come,—it will not be broken up; but then, when, I doubt not, steam locomotion will have become general, and all prejudices subsided, the "Infant" may be preserved in one of our national repositories of art.

Apologizing for the length of my letter, I remain, sir, your obedient servant,

A Retired Tradesman.

London, October, 1834.

[From the American Railroad Journal.]

We have great pleasure in publishing the following letter and facts, furnished us by an esteemed friend now abroad.

London, Sept. 23, 1834.

To the Editor of the Railroad Journal, &c.

Sir,—Having occasion, a few days since, to accompany two Philadelphia gentlemen to call on Mr. Hancock, who has steam carriages travelling on the common roads of this metropolis, I beg to give you some memoranda of the information I obtained from the conversation with that gentleman, which may probably interest the numerous readers of the excellent and most useful "American Railroad Journal," which I receive regularly from my brother in Philadelphia, and always peruse with the greatest pleasure.

Enclosed I send you the principal information derived from Mr. Hancock.

Before I left home (Philadelphia) last spring, I had frequently endeavored to gain information respecting the expediency (the practicability has been established beyond doubt by the engines of Gurney, Ogle, Hancock, Maceroni, &c.,) of steam carriages on turnpike roads, and pavements, but could not obtain any facts to satisfy me that they could be used in competition with coaches drawn by horses. Since my arrival in London, the information given induces me to believe they *may*, under favorable circumstances, *in this country*, compete with animal power, but I strongly doubt whether they will answer equally well in our country; and I think it highly probable that, in the course of a short time, they will be much more generally used in England for stage coaches, and for the transportation of the mail. This opinion is founded on the following circumstances: 1st, horses are costly in England, and are maintained at great expense; 2d, the roads are good, and kept in perfect order; 3d, steam power is cheap, owing to the low price of all machines made of metals, as well as the low price of fuel. In our country, on the contrary, horses are cheap, and are supported at one half the cost that is customary in England; 2d, our roads are unfortunately constructed on wrong principles,* and are consequently excessively bad, and will remain so until they are made on a better plan; 3d, fuel and labor are expensive in our country. From the above mentioned circumstances, I think there is some probability of their becoming useful machines in this country, but I cannot suppose they will be profitably employed in the United States. There are, however, some roads and streets on which they *might* be used—for example, between Boston and Salem; between Providence and Pawtucket; from the Battery to the highest part of Broadway in your city; and from the Exchange to the Schuylkill river, in my city; and there may be some other locations, which, however, it is unnecessary to mention, where the roads may be sufficiently good to enable the locomotives to travel on them; but it is out of the question to expect them to travel over turnpikes equally bad as those of my native state, which, although not so bad as in some of the other states, are so rough as to be discreditable to our citizens.

I have written you a few hasty lines, which, however, are at your service, if you wish to make use of them; and if I can do any thing to be useful to your publication whilst in this country, I shall be much pleased to aid in any way you may point out. My address is, care of Timothy Wiggin, Esq., London, or care of A. & G. Ralston, No. 8 South Front street, Philadelphia, by which channels every thing will be carefully forwarded to me. I am, very respectfully, your obedient servant,

Gerard Ralston.

Liverpool, Oct. 24, 1834.

Postscript.—By some oversight, I find that I did not send this communication to you at the time I ought to have done so. Since the date of my preceding letter, I have made several journeys in the "Autopsy" and "Era," and have not seen nor heard any thing to alter my views as expressed above. It is, however, proper to mention to you that, from my occupation in this country, namely, to

---

* To prevent misconception, it may be proper to mention in what respects our turnpikes are defective. 1st, They are too *convex*; they rise too much from the sides to the centre, and the consequence is that all the travel is forced on to the crown of the road, which is soon worked into *four ruts*, two of which are formed by the two horses' feet, the other two by the wheels of the carriages; but if the roads were nearly flat, as they are in England, the travel would be equal over the whole surface, and then every part of the road would be equally good. The 2d defect is the *metal* is not homogeneous, (hard and soft stone ought never to be used together,) and not broken sufficiently small. The 3d defect is the absence of sufficient under-draining. On our turnpikes, and indeed even in our streets, I have seen *uncovered drains* across the roads, which of course cause an inequality of the surface, and injure the carriage and horses, and interfere with the comfort of the persons in the carriage. I hope most sincerely my countrymen will "mend their ways"—they are now abominable; and it would not be more expensive to make roads equally good as those in Great Britain and Sweden, than to make them in their present bad condition.

furnish railway iron, locomotives, &c. &c., for various railroads in the United States, I am frequently brought into company with some of the most eminent engineers of this country, of all of whom I have inquired their opinions respecting the expediency of locomotives on turnpikes—they have invariably replied, "They will not be profitable." They say, "You can see them running on the roads—they go beautifully, and you suppose prosperously, but they work to a disadvantage of 10 to 1 compared with locomotives on railways, and it is impossible for them to supersede horses on turnpikes or locomotives on railways."

Mr. Hancock, who is undoubtedly a man of genius, and is, withal, very quiet and unpretending, appears quite confident that he has succeeded, and that he is now making money. In a few months more, it is probable, if he continues to run, that he will be able to divulge to the public something of an official character, that will satisfy all doubters either of the expediency or inexpediency of this mode of locomotion. The question is no longer one of practicability, but of profit. It is proved to be practicable; but will it be profitable, is the important question. I shall return to London in a few days, and should I hear any thing of importance on this subject, I will have the pleasure to communicate it to you. In the mean time, yours, respectfully, G. Ralston.

—

Facts relative to the Use of Steam Carriages on Common Roads, furnished by Mr. G. Ralston.

Called on Mr. Hancock, who gave me information respecting the "Era" and "Autopsy," constructed by him, as follows.

The cost is £700 each. They each have 2 steam engines, of about 10 to 12 horse power, high pressure, and accommodate 14 passengers each. Coke is the fuel used; ½ bushel per mile is consumed, and 100 lbs. of water per mile. The capacity of the boiler is 700 lbs. of water, which would be sufficient for a distance of 7 miles. The weight of the omnibus complete is 3 tons, exclusive of fuel and water. The road and pavement, (from the neighborhood of the Bank of England to Paddington,) over which these carriages travel, is the worst in the neighborhood of London; indeed, I think it the worst road I ever saw in England. The distance is 3 miles on the most frequented thoroughfare in the world, and it is astonishing how perfectly controlable it is, how easily it is guided, how easily stopped—indeed, it is much more controlable than a two-horse omnibus. It goes at the rate of 10 to 12 miles per hour, which, for the present, is considered the most economical speed. The Pentonville hill, which these carriages ascend, has a rise of 1 in 20, but the Autopsy has gone over hills on the Brighton road of 1 in 10 feet. There is a hill between London and Brighton of 1¾ mile long, which this carriage ascended at the rate of 9 miles per hour, at the commencement of the rise, and gradually diminished its speed to 6 miles per hour. The "Era" performed the following wonderful feat a few days ago: She dragged the "Autopsy" over the bad road to Paddington, up the Pentonville hill to the station, both carriages being full of passengers. The weight of the two, with their loads, is estimated at near 8 tons.

Animal Power.—Dupin states, that the animal power in Great Britain is eleven times as great as the manual power, while in France it is only four times as great.

The following is the number of horses for every 1000 inhabitants in the countries mentioned. Hanover, 193; Sweden, 145; Canton de Vaud, in Switzerland, 140; Great Britain, 100; Prussia, six Provinces, 95; France, 79.—[Quar. Jour. of Agr.]

Feather Beds.—The want of feathers is altogether artificial, arising from a disregard of the physical and moral well-being of infants and children; and he who has the good fortune never to have been accustomed to a feather bed, will never in health need or desire one, nor in sickness, except in cases of great morbid irritation, or excessive sensibility, or some disease in which the pressure of a firm or elastic substance might occasion pain. But when a rational regard to the preservation of health shall pervade the community, feathers will no more be used without necessity, or medical advice, than ardent spirits will be swallowed without the same necessity or advice. The physician has frequent occasion to see persons who are heated, sweated, and enfeebled, by sleeping on feathers, as if from a fit of sickness, enervated, dispirited, relaxed, and miserable.—[Med. Intel.]

Cure for Weak Eyes.—Take a small lump of white copperas, say about the size of a pea; put it in a small phial, holding about two ounces of water: carry this in the pocket, and occasionally taking out the cork, turn the phial upon the finger's end, and thus bathe the eyes. This will positively effect a real cure in a short time.

Cure for the Sting of a Wasp.—A few days ago, happening to be in the country, we witnessed the efficacy of the remedy for the sting of a wasp, mentioned in one of our late papers. A little boy was stung severely, and was in great torture, until an onion was applied to the part affected, when the cure was instantaneous. This important and simple remedy cannot be too generally known, and we pledge ourselves to the fact before stated.—[Liverpool Mercury.]

Potato Starch.—Let the potato be taken and grated down to a pulp, and the pulp placed upon a fine sieve, and water made to pass through it; the water will be found to have carried off with it an infinite number of particles, which it will afterwards deposit in the form of white powder, separable by decantation, which powder is starch, possessing all the essential properties of wheaten starch.—[Loudon.]

Employment of Time.—A person takes up some useful or agreeable book every morning at breakfast, and at the end of the year has spent agreeably, and we may say profitably, as many half hours as will come to nearly three weeks; another always takes up a Latin grammar, and a Janua Linguorum, in the same intervals, and at the end of the year has acquired a tolerable knowledge of Latin. Thus, you see, that whether a young man shall know two or three languages besides his mother tongue, and something of natural history and philosophy, may depend on the seeming trifling circumstance of how he spends the few spare minutes at the beginning and ending of his meals, from the age of fifteen to twenty-five.

Zincography.—It was but a few years past that we had to record an advance in the fine arts in the invention of lithography, which afforded increased facilities in the art of engraving. Lithography is now, however, likely to be displaced, at any rate to a great degree, by the invention of an ingenious Frenchman. M. Breugnot, who has succeeded in preparing a composition of metal, the basis of which is zinc, upon which drawing and writing can be effected with equal, if not with greater facility, than upon stone, and as easily applied to paper with the same machinery. The art of zincography has several advantages over that of lithography; among others, in the portability and comparative cheapness of the plates, over the necessary bulkiness and cost of stone. These plates can even be adapted to a lady's portfolio, to any thickness, and to any size—a desideratum much wanted in lithography. The invention of zincography has received the sanction of the Royal Academy of Paris, and we understand that M. Breugnot has sold the patent for Great Britain to Mr. Chapman, of Cornhill, who feels confident that he shall be able to adapt this improvement to every department in the art of engraving. In Paris they have already succeeded in printing large window blinds with one plate, and we believe experiments have been made on silk and cotton, which warrant the supposition that zincography will soon be applied in our silk and cotton printing establishments.—[Lon. Morn. Herald.]

Oyster Lamp.—M. de Lavage remarked, on opening an oyster, a shining bluish light, which, on nearer examination, he discovered to be phosphorus. On scooping it out of the shell, it extended nearly half an inch in length, and when immersed in water, seemed in every respect the same as artificially prepared phosphorus. The oyster in which this was discovered was perfectly alive and fresh. The light could not therefore proceed from any decomposition in the shell of the animal, but must have been derived from some other source. Upon examining this phosphorescent substance by the aid of a microscope of considerable power, it was found to consist of various animalculæ, each beautifully luminous, like miniature glow-worms, lighting up their starry lamps to illuminate the dark solitary chamber of the shell, and intended, perhaps, to lure within its reach such marine inhabitants as it might prey upon.

Blasting Rocks.—As many lives are yearly lost by the untimely explosion of the powder used for blasting rocks, humanity prompts us to give a process as we heard it described a few days since, by a person who had been injured in a mine where many accidents of the kind had happened, which led them to try other methods of charging the rocks than those commonly practised, and which he said ended in the discovery of a safe and expeditious manner of blasting. As these accidents had uniformly happened in what he denominated the "tamping" or driving down the brick and other substances used in filling above the powder, they, for an experiment, substituted plaster of Paris, which had been heated, as for preparing cement, which they mixed with water in the same manner, and poured the cement into the hole upon the powder, having first introduced the quill or fuze; the cement immediately set or hardened, when the blast was ready for firing. He said that he never knew a blast managed in this way to fail of doing well, and never knew an accident happen; that it was quicker done, and was more economical in every respect. If this should prove correct, it should be generally introduced.—[Gen. Farmer.]

Mud Walls.—Mr. Loudon, in his Notes on Country Seats, observes, "Mr. Stanley assured us that, when built on good flint or brick foundations, and well thatched, with the eaves projecting so far as completely to throw off the rain, these walls will last for an unknown length of time. They are very common in Wiltshire, and make excellent farmyard as well as garden walls, and the warmest of all cottages. In our Encyc. of Architecture, § 838 to 843, will be found a detailed description of the mode of building cob walls in Devonshire, where houses two or three stories high are built in this way. This account was sent us by a clergyman, who states, as a proof of their great durability, that he was himself born in a cob parsonage, built in the time of Elizabeth. The Devonshire mode, and that practised in Wiltshire, appear to be exactly the same. The Cambridgeshire mode is different, and is also given in the work referred to, § 159. The French mode (pise,) which is more elaborate, will be found in our Architectural Magazine, vol. i., as applicable to one of the most economical designs for a group of four roadside cottages (by Mr. Wilds, surveyor, Hertford,) which we have anywhere seen. We would not, however, be understood as recommending cob, mud, or pise walls, either for cottages, or any thing else, where brick or stone can be procured; but we should certainly prefer them to log-houses, as being safer from fire, warmer in winter, and cooler in summer."

Dyeing Maple or Satin Wood.—Embellishing maple or satin wood with cochineal is an old Swedish practice. In that country, they use knotty pieces and roots of the birch, which they appear to plane with a plane that is not very sharp, so as to throw up the fibre more in some places than in others; they then dip these thin boards into dyes of various kinds, and as the raised fibres imbibe color faster than the smooth cut parts, a delicate variety of tint is easily produced. The boards, when dry, are smoothed and varnished, and make very beautiful furniture.

Best Preparation of Black Lead for cleaning Stoves.—Mix powder of black lead with a little common gin, or the dregs of red port wine, and lay it on the stove with a piece of linen rag; then with a clean, dry and close, but not hard brush, dipped in dried black lead powder, rub it to a beautiful brightness. This will be found to produce a much finer and brighter black varnish on the cast iron, than either boiling the black lead with small beer and soap, or mixing it with white of egg, &c., which are the methods commonly practised.—[Domestic Encyclopedia.]

Cheap Mode by which Farmers and others may manufacture Charcoal.—Provide a hollow cylindrical cast iron back log for the fireplace, not so long but that it may become heated throughout its length. One end may be permanently closed and the other covered with a cap. Drill small holes in it from one end to the other, about a line in diameter. Fill this back log with blocks of wood or chips, and put on the cap. When heated, the inflammable air and tar that issue from the holes will aid the fire. In defect of a cast iron log, a joint of stove pipe may answer temporarily.

Preservation of Meat.—Meat may be preserved fresh many months by keeping it immersed in molasses. A joint of meat, or any provision, suspended in a flannel bag, will keep sweet much longer than by most of the modes commonly practised. The cooler and dryer the meat is when the flannel is put round it the better, and the flannel should be perfectly clean. Fresh meat put in a close vessel containing vinegar, will be preserved a considerable time. Tainted meat will be rendered good by pickling it in pearl-ash water some time. Before it is cooked, however, it should be dipped in vinegar a short time, and then salted in brine.

To give to New Cheese the Flavor of Old.—If it be required to communicate to a new cheese the flavor and appearance of an old one, it may be done by the insertion in the new cheese of portions of the old one containing blue mould. The little scoop which is used in taking samples of cheese is a ready made means of performing the operation, by interchanging ten or a dozen of the rolls which it extracts, and placing them so as to disseminate the germ of the blue mould all over the cheese. A new Stilton cheese, treated in this way, and well covered up from the air for a few weeks, becomes thoroughly impregnated with the mould, and generally with a flavor hardly to be distinguished from the old one. I have sometimes treated half a Lancashire cheese in this way, and have left the other half in its natural state, and have been much amused with the remarks of my friend on the striking superiority of the English over the Scotch one.—[Agricultural Journal.]

On preserving Wood from Decay, Dry Rot, &c.

Fredericksburg, Va., Nov. 10, 1834.

To the Editor of the Railroad Journal, &c.

Sir,—In answer to your inquiry, for "a cheap and an effectual method of preserving wood from decay, and destruction by worms, dry rot, &c.', I have resumed a course of experiments on this subject, which I commenced in the summer of 1830; and trust that I shall soon be able to satisfy the public that the thing is both practicable and economical. I find my experiments confirmed, in my own mind, at least, by a careful examination of the petrifying earths and waters of Virginia. We have only to follow in the simple path of nature, and we see at once how the operation is performed. I will not at this time enter into the nature and cause of the dry rot, &c. Whether it is a little fungus, that lives and derives its nourishment from the tree within, as the mistletoe does from the tree without—or whether it is a chemical change, produced by absorption of moisture,—I leave for others to determine. It is sufficient to say that there is a principle of decay in most timber, which is more or less active whenever the wood is exposed to the atmosphere and moisture. There is also a saccharine principle, which is the food of worms; and there is also a process of fermentation which hastens its destruction.

This fermentation must be prevented; this saccharine principle must be destroyed; and the pores of the wood must imbibe some material which will effectually fortify it against moisture and the chemical action of different earths and atmospheres. The process by which I effect this is comparatively cheap and simple. I have obtained a patent for the same, and am now ready to receive proposals for furnishing timber of all descriptions for purposes where durability is especially required. If the timber does not answer the end proposed, or endure a certain number of years, according to contract, I will engage, and give security, to refund the amount expended in the experiment.

Some specimens of sapling pines, which I have carried through the process of preservation, and which have since been exposed, are now without the least appearance of decay, while the remainder of the same tree, alike exposed, is already in ruins.

Very respectfully, yours,

Forrest Shepherd.

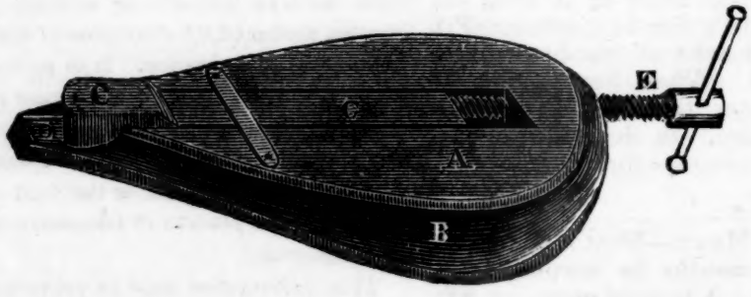
Specification of the Patent granted to JOHN PAUL NEUMANN, *of Cornhill, in the City of London, Merchant, for certain Improvements in making or producing Leather from Hides and other Skins.* Sealed December 21, 1833.

To all to whom these presents shall come, &c. &c. *Now know ye*, that in compliance with the said proviso, I, the said John Paul Neumann, do hereby declare that the nature of the said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, (that is to say):

The novelty and utility of the new invention communicated to me by a certain foreigner, residing abroad, consists in employing the hop plant, whether root, stalks, or leaves, or any part thereof, either in a green or dry state; but I prefer the use of the plant in a dry state, and for the sake of economy, I give the preference to the stalks and the roots; but be it understood, although I prefer the hop plant, or any part thereof, to be used by itself for the purpose of tanning, yet they may be used in conjunction with any vegetable containing tanning matter. The mode to which I give the preference for this plant to be used for the purpose of tanning, is to grind or reduce it as fine as practicable, and, when so prepared, it may be employed for every mode of tanning in the same manner as oak bark, or any other vegetable containing tanning matter. According to circumstances of different hides or skins, this tanning matter may be applied either warm or cold, whether in extract or mixed with other matter; every practitioner in tanning will soon perceive which mode is most applicable for the different hides or skins which he means to subject to the process of tanning, as hides and skins require different modes of treatment; with some it is necessary to use heat or warmth, and others cold; but I prefer to have the hides or skins prepared in the usual mode hitherto followed by practical tanners.

The principal novelty of this invention consists in using the hop plant for tanning, which hitherto has never been employed for that purpose; and by means of this process it will be rendered both useful and valuable for the purpose of tanning.—In witness whereof, &c.

Enrolled June 20, 1833.



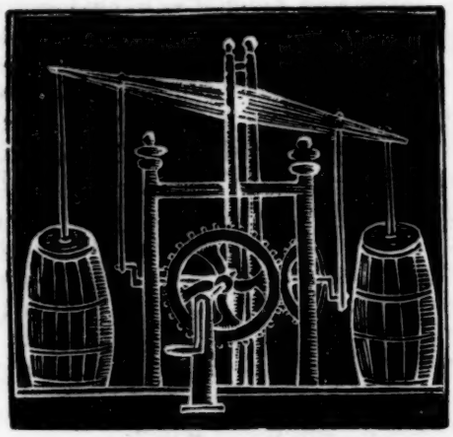
Patent Collar Block, of Dyer Cleaveland, of Oswego, Tioga county, N. Y. Letters patent secured on the 13th day of September, 1834.

They are made either of wood or cast iron; if of wood, in the following manner: First, a block of wood is formed to the shape seen in the engraving, about twenty-two inches long, sixteen inches wide, and about eight inches thick; the upper surface, A, in the widest place, is eight inches, and about sixteen inches in length, and the under part of the block, at B, is four inches wider, and extends in a proportional width all round the upper part, A, and is formed in a concave manner, so that it will fling the belly of a collar out, and form it into a proper shape to fit and set easy on a horse. C is a piece of wood that is moveable in a channel cut out in the upper surface of the block, to the depth of about four inches, in which the piece of wood, C C, moves back and forth by the operation of the screw E, that enters the end of the block and comes in contact with the sliding piece of wood C C, and driving it into the end of the collar, draws it tight to the block, and gives to the collar the requisite form and stretching, thereby ridding the collar of all wrinkles. D represents the end of the channel.

It is the opinion of some of the best judges that this machine far surpasses any thing of the kind that has been offered to the public, it being more simple in its construction, and far more convenient and complete in its operation, as it does its work in a perfect manner. After the collar is sewed together, it can with the greatest ease and pleasure be blocked in perfect form in five minutes,

and there is no necessity of roping the collar on this machine.

N. B.—It is obvious that a collar cannot be blocked on Messrs. Post's and Whitney's machines without the rope, and then always before the collar is sewed together, which leaves the collar imperfectly formed.



Pratt's Patent Churning Machine.—Invention has been on the stretch for many years to produce the best plan for a churning machine. Mr. Pratt has hit upon a contrivance, simple, but at the same time so effective, that a child can do the thing required. Mr. Pratt has the most ample testimonials from Dr. Hosack, Peter R. Livingston, &c. &c. of the practical utility of his invention. After ample experience, they pronounce it the most perfect machine they have ever seen for facilitating the operation of churning. Such, say they, is the power, that a boy of ten years of age can churn a barrel of milk without fatigue.

The machine, the certificates of its practical utility, and the terms on which individuals, towns, counties, and states, may be purchased, are to be seen at No. 41 Courtlandt street, New-York.

Patent Sash Lines.—These sash lines are nothing more nor less than braided lines manufactured by machinery, and may be made of cotton, wool, flax, hemp, or any staple that can be formed into thread. The cost is little more than twisted ropes or lines. Articles braided in this manner will not be subject to kinks, nor to untwisting, and of course will be stronger than lines. It would, we should suppose, be preferable to the common ropes for rigging of vessels. The number of strands may be as numerous as is thought advisable. We see no reason why these lines or ropes should not supersede the common ones for a great variety of purposes, such as halters, traces, harness, &c. We are assured Mr. Mann, at the corner of Stanton and Cannon streets, is the only manufacturer of this article in this city. A sample of these cords is left at the office of the American Institute, No. 41 Courtlandt street, New-York, for inspection.

New Moving Power.—At a meeting of the French Academy of Sciences on the 16th of June, a very interesting communication was read from M. Thilorier, a skilful chemist, who exhibited to the Academy the apparatus by which he procured a litre (two pints) of liquid carbonic acid in a few seconds. The properties of this substance, he observed, have been but little examined, chiefly because it requires to be confined in close vessels, hermetically sealed, and capable of resisting a great pressure. It surpasses all known bodies in the expansion and contraction which it undergoes from given variations of temperature. By raising the temperature from 0 to 30 centigrade (32 to 86 of Fahrenheit) a column of the liquified gas is elongated one half. With the same change of temperature, a similar column of air is only elongated one eighth. This enormous dilatation, M. Thilorier thinks, will in future afford the elements of a moving power infinitely more effective, as well as economical, than that which is derived from the expansion of vapor.

New Invention—*The Proverb realized, "the Cart before the Horse."*—In the month of May last, there was seen, in the streets of Manheim, a horse pushing before him a carriage, guided with much address by Baron Drais, the author of this invention, which is attended with great advantages: 1. The horse cannot run away. 2. The carriage is not exposed to the dust and dirt generally thrown up by the horse. 3. The prospect is not interrupted by the coachman and the horses. 4. The conversation of the travellers cannot be overheard by the coachman. 5. The travellers are not incommoded by the fumes of the tobacco, &c. The coach-box will be placed on the roof of the carriage, behind, and by means of a looking glass the driver is able to guide the vehicle. This invention is applicable to carriages drawn by four horses.—Heidelburg, Aug. 15.

Improved Lights.—A new method of diffusing light through a theatre has been discovered by a mechanist at Venice. By the aid of parabolic mirrors, the light of many lamps is concentrated over an opening made in the ceiling of the theatre, and reflected down on a system of plano-concave lenses, of a foot in diameter, which occupy the

aperture, and convey into the theatre the rays of light, which arrive at them parallel and depart from them divergent. From the pit the lenses are alone perceived, which resemble a glowing furnace; and although the luminous focus is sufficient to light the whole of the theatre, it does not dazzle, and may be viewed without fatiguing the eyes. The apparatus being entirely concealed, accommodates itself readily to all the changes which the representation can require. It likewise occasions neither smoke nor bad odors, and has none of the inconveniences of the ancient system.

An Economical Substitute for Copying Machines.—In the common ink used for writing dissolve with it one drachm of loaf sugar to each ounce of ink; moisten a sheet of unsized paper to copy with, and put it between two sheets of the same paper, to absorb the superfluous moisture; then put the moistened paper on the writing, when by passing a roller once or twice over its surface, you will have a perfect fac-simile struck on the copy paper, without injuring the original in the least.—[Eclectic Journal of Science.]

Purification of Wine.—Plaster of Paris (*gypsum*) is excellent for rendering thick, turbid wine, clear and pure from foreign matter. This method of clarifying wines was well known to the Greeks and Romans, who always put it into new wine, where it was suffered to remain some time. It improves the flavor too, and this fact they understood. Put a small quantity of the gypsum flour into each bottle, and having shaken it a little, set it away till the liquor is needed for use.—[Scientific Tracts and Lyceum.]

A Profitable Garden.—There is a garden called Shah Chiragh in the neighborhood of Shiraz, in Persia, in which is the tomb of the brother of an imam, who was suddenly killed on that spot, at which famous miracles are said to be wrought every Ramazan. The mootuwulli, or proprietor, in whose family the property has been for many ages, finds its supposed sanctity worth, to him, nine thousand dollars a year. To keep a proper degree of zeal alive in the people, he tutors a man for the business, who, for a few months before Ramazan, appears miserably sick, but on that day, there being but one in the whole year on which cures are effected, touches the soil of the garden, and stoutly cries to Ali for help, and then instantly recovers.—[Scientific Tracts.]

Loss of Memory from Gin.—A very sensible writer in a foreign journal relates that his power of memory was partially destroyed by the use of gin, and that he recovered that important faculty simply by leaving off his drams. He has the good sense to say further, and he is a physician, that he has scarcely any confidence in any preparation of alcohol. With us, we could tell the gentleman alcohol is considered a positive poison, never to be touched.—[Ibid.]

Human Strength.—From the result of experiments made in Portsmouth dock-yard, in driving and pressing in large iron and copper bolts, a man of medium strength, striking with a mallet weighing eighteen pounds, and the handle of which was forty-four inches long, would start a bolt about one eighth of an inch every blow. It required a pressure of one hundred and seven tons to press the same bolt down the same quantity of space, but a small additional weight pressed it completely home.

Noble Sentiments.—Lord Erskine was distinguished through life for independence of principle, for his integrity, and for his scrupulous adherence to truth. He once explained the rule of his conduct, which ought to be generally known and adopted. It ought to be deeply engraven on every heart. He said: It was the first command and council of my youth, always to do what my conscience told me to be a duty, and to leave the consequences to God. I shall carry with me the memory, and I trust the practice, of this paternal lesson to the grave. I have hitherto followed it, and have no reason to complain that my obedience to it has been even a temporal sacrifice. I have found it, on the contrary, the road to prosperity and wealth, and I shall point it out as such to my children.

Hybernating Animals.—The bat, hedgehog, dormouse, and marmot, possess all the characteristics of the mammalia, and are only distinguished from others by their hybernation, during which they are converted for a time into cold blooded animals, because their temperature is scarcely higher than that of the atmosphere. Their breathing is irregular, and at long intervals, and no sort of nourishment is taken for several months. A curious field still remains unexplored, relative to the philosophy of this miraculous peculiarity of these particular animals.—[Scientific Tracts.]

Mice.—Naturalists assure us that mice cannot live on the Asiatic side of the Ural mountains. Capt. Cochrane, who travelled

on foot from St. Petersburg into Asia, over the formidable ridge of barren rocks, piled almost to the skies, says that the sable is never found in Asia. He further observes, that the oak will only flourish on the European side. At Ekatherinebourg that intrepid pedestrian visited a gold mine, into which he made an entrance by being let down in a basket to the depth of one hundred and sixty feet. He says that four thousand pounds of the earth brought from the bottom will scarcely yield, when washed, the value of one guinea.—[Ibid.]

Heat.—If heat, says Dr. Williamson, came in direct rays from the sun, it would follow that the quantity of heat on the surface of every planet would be inversely as the square of its distance from the sun, according to a former opinion. But experiments without number prove that such opinion is unfounded. Although light comes from the sun, and light has the power of exciting heat, it is clear that heat does not come from the sun. The experiment is conclusive in all warm climates, and in every climate where there are high mountains. At the foot of the Andes, near the equator, the inhabitants suffer by the heat of eighty or ninety degrees. Let them ascend the mountain, and before they have arisen two miles, they find themselves in the region of perpetual snow. How should this happen? They are surely nearer the sun on the mountain than upon the plain, and they are subjected to more of his rays; therefore, according to the alleged rule, they should be warmer; but they are, in fact, much colder, because they are in a thinner, or a lighter atmosphere. The issue is the same in all cases where the experiment has been made. On the Peak of Teneriffe, the traveller arrives at the region of frost at the very same height, or under the same weight of the atmosphere, that he finds it upon the Andes. If he could rise but two miles farther, it is not to be questioned that he would, in so thin an atmosphere, perish by the want of heat. Hence we infer that the degree of heat, in every planet, is according to the weight of its atmosphere, compared with its distance from the sun. We also infer that the inhabitants of the several planets cannot enjoy the same degree of heat, unless the weight of their atmosphere be increased according to their several distances from the sun.—[Ibid.]

Nudity favorable to Physical Developement.—On the authority of a celebrated writer, it is asserted that in those climates in which nudity is not incompatible with health, the exposure of the whole surface of the body to light is highly favorable to the regular conformation and developement of the body. This observation has been abundantly confirmed by Humboldt, in his voyage to the equinoctial regions. Deformity, and deviations from exact proportions and symmetry, are extremely rare in those races possessing dark skins, and particularly so in those who wear little or no clothing. He regards the influence of light upon the skin of as much real importance to the healthful condition of the individual, as wholesome air in the lungs. How far this conclusion is warranted by facts, future philosophers will probably determine.—[Ibid.]

The Black Death.—This great pestilence of the fourteenth century swept away, in four years, a fourth of the entire population of Europe. Indications of some dreadful calamity preceded the destroying malady, for more than fifteen years. Parching droughts were followed by torrents of rain, unprecedented since the flood. Four hundred thousand were drowned in the capital of Kingsai, by the sudden rise of the rivers Kaing and Hoai. The mountain of Tsincheou was washed from its very foundations, and left vast chasms in the earth. One year after, 1334, the neighborhood of Canton was inundated, while in Tche, after an unexampled drought, a plague arose, which swept off, with irresistible force, about five millions of people. When the black death reached England, both the air and the water were so saturated with something destructive to animal life, that fishes died in the rivers, and five thousand cattle died in one pasture. It maintained its empire from 1347 to 1350, with unabated fury.—[Ibid.]

Commerce.—The three countries with which the United States have the most commerce, are England, France, and Cuba. The imports from England in 1833 amounted to $36,668,315; from France, $13,431,678; and from Cuba, £9,754,-787. The exports were to England, $31,935,-441; to France, $13,772,221; to Cuba, $5,682,-700. The States which carry on the greatest foreign commerce are New-York, Massachusetts, Pennsylvania, Louisiana, and Maryland. The principal ports are New-York, Boston, Philadelphia, New-Bedford, New-Orleans, Portland, and Baltimore. The tonnage of New-York is nearly 300,000; that of Baltimore 47,000. The chief articles of export are cotton, tobacco, flour, rice, and pork, the cotton amounting to 36 millions, the pork to 2 millions.

[From the American Railroad Journal.]

On the Substitution of Locks for Inclined Planes and Stationary Steam Engines, on Railroads.

To the Editor, &c.

Sir,—It is a desideratum with engineers and railroad companies, to discover a substitute on railways for inclined planes and stationary steam engines. This mode of ascending elevations is noticed and deprecated by Geo. W. Smith, Esq., editor of Wood's American edition on Railroads, in the following remarks.

"Stationary steam engines on inclined planes are an opprobium to the present advanced state of the science of civil engineering—they are exceedingly inconvenient, expensive, and dangerous. If the plane be steep, the locomotive engine cannot be advantageously drawn up with the waggons they have conducted to the foot of the plane; the great inconvenience of this system is too apparent to require comment. Hence, any available plan, which will *enable locomotive* engines to ascend inclined planes, with their *full complement* of waggons, will be a most valuable addition to the utility of railroads." He adds, "unless the height to be overcome be great, compared with the length of the whole line of railway, the delay resulting from the diminution of speed will be a trivial inconvenience, when the advantages of dispensing with an expensive stationary power are estimated."

We have not yet experienced the same fatal effects from inclined planes and stationary engines that they have in England, where many lives have been sacrificed by that mode of elevating. Some accidents have occurred in the United States, and they will probably multiply as inclined planes increase, until they produce the same appalling effects they have, and daily do, in Great Britain. There is no question but inclined planes, and stationary steam power, are not only the most expensive, but the most dangerous, parts of a railroad, and the individual who discovers a less dangerous and expensive substitute, though not as speedy, will deserve well of the community. It is rumored that a mode of ascending by locks is contemplated by some gentlemen in this city, and a patent has been, or is intended to be, obtained for the invention. I cannot discover any great difficulty of ascending acclivities by locks, at a much less *original* expense than excavating and furnishing them for inclined planes; but whether the danger and subsequent expense are diminished in the same proportion with the speed—(for locks must be a slower mode of elevating)—is not obvious. It is a subject of much interest to the community, and any probable method of surmounting elevations, than by inclined planes and stationary engines, merits attention and investigation. I feel some solicitude, Mr. Editor, to hear or see more of this lock project, and the inventor has my best wishes for the ultimate attainment, by locks or otherwise, of an elevating power, combining greater economy with less hazard, than the one now in use.

A Subscriber.

Memoir of Robert Fulton,

WHO WAS THE INVENTOR OF STEAM NAVIGATION.

[From Dunlap's History of the Rise and Progress of the Arts of Design in the United States.]

The parents of this gentleman were of Irish origin: the father, a native of Kilkenny—the mother a Pennsylvanian, by name Smith, and descended from Hibernian emigrants. Robert was the oldest of two sons: he had three sisters, two older than himself. He was born in Little Britain, in the county of Lancaster, Pennsylvania, in 1765, and showed early indications of his attachment to mechanics; but was, as a youth, still more devoted to the pencil. He commenced the painting of portraits and landscapes, as a profession, at the age of seventeen; that is, in the year 1782, and continued so employed until 1785. During this period, Charles Wilson Peale was the principal painter in Philadelphia, until Pine's arrival; and doubtless Fulton did not neglect the instruction to be derived from them and their pictures.*

Robert Fulton, at the age of 21, had, by his industry and frugality, enabled himself to purchase a little farm in Pennsylvania, on which he established his mother, and soon after crossed the Atlantic to seek instruction from Benjamin West. That Mr. West justly appreciated the character of his young countryman, is attested by his presenting him with two pictures: one representing the great painter with his wife's portrait on his esel; and the other Fulton's own portrait.

Mr. Fulton, perhaps by invitation, practised as a portrait painter in Devonshire, and here appears to have revived his attachment to mechanics. Canal navigation attracted his attention, as he here became acquainted with the Duke of Bridgewater, and they became united by their mutual love of science. Lord Stanhope and Fulton were attracted to each other by similar propensities. In 1793 was published a print, engraved by Sherwin, from a picture by Fulton, of Louis XVI. in prison, taking leave of his family. The only copy I have seen is possessed by my friend Dr. Francis: it is now a curiosity. As early as 1793, Fulton's mind was engaged in projects to improve inland navigation. In 1794 he obtained a patent for a double inclined plane, and other patents, from the

* "Robert Fulton," says Edward Everitt, "was a portrait painter in Pennsylvania, without friends or fortune." A school-fellow of Fulton says, "Robert Fulton was a school-boy in Lancaster, Pennsylvania; his mother then a widow. He borrowed paints and brushes of another, and soon excelled, but neglected his books. He was sent to Philadelphia, to a silversmith; but not liking, he went to London."

British government. For eighteen months he resided in Birmingham, and improved his knowledge of mechanics in that great workshop.

In 1795 he published several essays, which elicited the compliments and recommendations of Sir John Sinclair and the Board of Agriculture. The profession of a painter was abandoned, and his knowledge of the art of design applied to drawings on the subjects which now engaged his mind.

In the year 1797 Mr. Fulton had apartments in the same Parisian hotel with Joel Barlow; and a friendship was then formed between these two eminently gifted and amiable individuals, which was only broken by death. When Mr. Barlow established himself in a style befitting his public station, in a hotel appropriated to himself and lady, he invited Fulton to make one of his family. Here he resided seven years, during which he studied the modern languages, and the higher branches of science. During this time Fulton also projected a panorama, in imitation of Barker. It had some success, and is said to have been the first seen in Paris. But his mind was occupied with other projects, particularly the explosion of gunpowder under water. His torpedoes were offered to the French and Dutch governments; and when Bonaparte became first consul, he appointed a commission to examine Fulton's plans, and assist in making experiments.

When chancellor Livingston arrived in Paris, the intimacy between him and Fulton commenced, which led to the fulfilment of his destinies, by the accomplishment of steam navigation.

If the failure of Mr. Fulton's schemes for the destruction of ships of war, by torpedoes, fixed his attention upon navigating vessels by steam, we may congratulate the world that the conflicting nations of Europe, to whom with perfect indifference he seems to have offered his projects and services, for the destruction of their enemies, did not accept of them. If, as we believe, the views of Mr. Fulton were to banish naval warfare from the world, perhaps that change which will take place in defensive warfare, by the use of the steam frigate, such as Fulton built at New-York, in harbors and on coasts, may go far to answer the same end.

In 1801 Mr. Fulton repaired to Brest, to make experiments with the plunging boat he had constructed the preceding winter. This, as he says, had many imperfections, natural to a first machine of such complicated combinations. Added to this, it had suffered much injury from rust, in consequence of his having been obliged to use iron instead of brass or copper, for bolts and arbors.

Notwithstanding these disadvantages, he engaged in a course of experiments with the machine, which required no less courage than energy and perseverance. Of his proceedings he made a report to the committee appointed by the French executive; from which report we learn the following interesting facts:

"On the 3d July, 1801, he embarked with three companions on board his plunging boat in the harbor of Brest, and descended in it to the depth of five, ten, fifteen, and so to twenty-five feet; but he did not attempt to go lower, because he found that his imperfect machine would not bear the pressure of a greater depth. He remained below the surface one hour. During this time they were in utter darkness. Afterwards he descended with candles; but finding a greater disadvantage from their consumption of vital air, he caused previously to his next experiment a small window of thick glass to be made near the bow of his boat, and he again descended with her on the 24th of July, 1801. He found that he received from his window, or rather aperture covered with glass, for it was no more than an inch and a half in diameter, sufficient light to enable him to count the minutes on his watch. Having satisfied himself that he could have sufficient light when under water; that he could do without a supply of fresh air for a considerable time; that he could descend to any depth, and rise to the surface with facility; his next object was to try her movements, as well on the surface as beneath it. On the 26th of July he weighed his anchor and hoisted his sails: his boat had one mast, a mainsail, and jib. There was only a light breeze, and therefore she did not move on the surface at more than the rate of two miles an hour; but it was found that she would tack and steer, and sail on a wind or before it, as well as any common sailing boat. He then struck her mast and sails; to do which, and perfectly to prepare the boat for plunging, required about two minutes. Having plunged to a certain depth, he placed two men at the engine which was intended to give her progressive motion, and one at the helm, while he, with a barometer before him, governed the machine, which kept her balanced between the upper and lower waters. He found that, with the exertion of one hand only, he could keep her at any depth he pleased. The propelling engine was then put in motion, and he found, upon coming to the surface, that he had, in about seven minutes, made a progress of

four hundred metres, or about five hundred yards. He then again plunged, turned her round while under water, and returned to near the place he began to move from. He repeated his experiments several days successively, until he became familiar with the operation of the machinery, and the movements of the boat. He found that she was as obedient to her helm under water, as any boat could be on the surface; and that the magnetic needle traversed as well in the one situation as the other.

"On the 7th of August Mr. Fulton again descended, with a store of atmospheric air compressed into a copper globe of a cubic foot capacity, into which two hundred atmospheres were forced. Thus prepared, he descended with three companions to the depth of about five feet. At the expiration of an hour and forty minutes, he began to take small supplies of *pure* air from his reservoir, and did so as he found occasion, for four hours and twenty minutes. At the expiration of this time he came to the surface, without having experienced any inconvenience from having been so long under water.

"Mr. Fulton was highly satisfied with the success of these experiments; it determined him to attempt to try the effects of these inventions on the English ships which were then blockading the coast of France, and were daily near the harbor of Brest.

"His boat at this time he called the submarine boat, or the plunging boat; he afterwards gave it the name of the Nautilus; connected with this machine were what he then called submarine bombs, to which he has since given the name of torpedoes. This invention preceded the Nautilus. It was, indeed, his desire of discovering the means of applying his torpedoes, that turned his thoughts to a submarine boat. Satisfied with the performance of his boat, his next object was to make some experiments with the torpedoes. A small shallop was anchored in the roads, with a bomb containing about twenty pounds of powder; he approached to within about two hundred yards of the anchored vessel, struck her with the torpedo, and blew her into atoms. A column of water and fragments was blown from eighty to one hundred feet in the air. This experiment was made in the presence of the prefect of the department, Admiral Villaret, and a multitude of spectators.

"The experimental boat of Mr. Livingston and Mr. Fulton was completed early in the spring of 1808: they were on the point of making an experiment with her, when one morning, as Mr. Fulton was rising from a bed in which anxiety had given him but little rest, a messenger from the boat, whose precipitation and apparent consternation announced that he was the bearer of bad tidings, presented himself to him, and exclaimed in accents of despair, "Oh, sir, the boat has broken in pieces and gone to the bottom!" Mr. Fulton, who himself related the anecdote, declared that this news created a despondency which he had never felt on any other occasion; but this was only a momentary sensation. Upon examination, he found that the boat had been too weakly framed to bear the great weight of the machinery, and that in consequence of an agitation of the river by the wind the preceding night, what the messenger had represented had literally happened. The boat had broken in two, and the weight of her machinery had carried her fragments to the bottom. It appeared to him, as he said, that the fruits of so many months' labor, and so much expense, were annihilated; and an opportunity of demonstrating the efficacy of his plan was denied him at the moment he had promised it should be displayed. His disappointment and feelings may easily be imagined; but they did not check his perseverance. On the very day that this misfortune happened, he commenced repairing it. He did not sit down idly to repine at misfortunes which his manly exertions might remedy, or waste, in fruitless lamentations, a moment of that time in which the accident might be repaired. Without returning to his lodgings he immediately began to labor with his own hands to raise the boat, and worked for four and twenty hours incessantly, without allowing himself rest, or taking refreshment: an imprudence which, as he always supposed, had a permanent bad effect on his constitution, and to which he imputed much of his subsequent bad health.

"The accident did the machinery very little injury; but they were obliged to build the boat almost entirely new; she was completed in July: her length was sixty-six feet, and she was eight feet wide. Early in August Mr. Fulton addressed a letter to the French National Institute, inviting them to witness a trial of his boat, which was made in their presence, and in the presence of a great multitude of the Parisians. The experiment was entirely satisfactory to Mr. Fulton, though the boat did not move altogether with as much speed as he expected. But he imputed her moving so slowly to the extremely defective fabrication of the machinery, and to imperfections which were to be expected in the first experiment with so complicated a machine, but which he saw might be easily remedied."

Mr. Fulton returned home in 1806, and renewed his efforts to prove that he could destroy vessels by invisible means, and the next year he made an experiment upon a hulk anchored in New-York harbor for the purpose. The owner of the hulk having consented, the experiment was fully successful. In 1810 the United States made an appropriation for trying the effect of torpedoes and other submarine explosions. The experiments were made upon the sloop of war Argus, Capt. Lawrence, and failed. Mr. Fulton's friends still thought, or said, that the experiments would be successful. Commodore Rogers thought and reported them altogether impracticable.

We all know that Fulton was not the first who propelled a boat by steam, but we know that we owe to him those inventions which remedied the failures of former experimenters, and, in fact, by his genius and skill, created the steamboat. Fulton was assisted by friends with advice and funds; but Fulton's was the mind and the perseverance which gave to the world a mode of conveyance, for speed, ease, and certainty, so powerful in its influence on travelling and commerce, as to have advanced civilization on its destined progress beyond any former gift bestowed upon man, printing excepted. He thus writes to his friend, Joel Barlow: "New-York, August 2, 1807. My dear friend, my steamboat voyage to Albany and back has turned out rather more favorable than I had calculated. The distance from New-York to Albany is 150 miles; I ran it up in thirty-two hours, and down in thirty hours, the latter is five miles an hour. I had a light breeze against me the whole way going and coming, so that no use was made of my sails, and the voyage has been performed wholly by the power of the steam engine. I overtook many sloops and schooners, beating to windward, and passed them as if they had been at anchor.

"The power of propelling boats by steam is now fully proved. The morning I left New-York, there was not perhaps thirty persons who believed that the boat would move a mile an hour, or be of the least utility; and while we were putting off from the wharf, which was crowded with spectators, I heard a number of sarcastic remarks. This is the way, you know, in which ignorant men compliment what they call philosophers and projectors.

"Having employed much time and money, and zeal, in accomplishing this work, it gave me, as it will you, great pleasure to see it so fully answer my expectations. It will give a cheap and quick conveyance to merchandise on the Mississippi and Missouri, and other great rivers, which are now laying open their treasures to the enterprise of our countrymen. And although the prospect of personal emolument has been some inducement to me, yet I feel infinitely more pleasure in reflecting with you on the immense advantage my country will derive from the invention."

Thus the first voyage, and that perfectly successful, was made in thirty-two hours from New-York to Albany. In consequence of this first voyage it is now made in nine hours.

Surely the discoverer enjoys a pleasure greater and purer than any other human being can enjoy. We mean the discoverer who has just views of the great advantages which will result from the successful termination of his researches. Not to mention many others, let us reflect upon the pure and intense joy of Columbus, when he landed on St. Salvador—of Franklin, when he succeeded in drawing the lightning, innocuous, from the thunder cloud—of Worcester, when convinced of the power of steam—and of Fulton, when he saw, felt, knew, that he could triumph over winds and tides, by machinery of his own invention—when he heard the acclamations of the scoffers, and received the praises of the wise.

"He published his work, entitled 'Torpedo War, or Submarine Explosions.' He adopted as a motto for his publication, his favorite sentiment, 'The liberty of the seas will be the happiness of the earth.' He addressed it to the President of the United States, and to the members of both houses of Congress. It contained a description of the experiments he had made, of his engines as he had improved them, and of the manner in which they might be used. He expressed the most sanguine expectations as to the effects they would produce, when they had attained the improvements of which he believed them capable, and had the advantage of practice, by which gunnery, and other modes of warfare, had been brought to their present perfection." Fulton's ideas respecting submarine guns led to the invention of the steam frigate.

"He communicated to Mr. Jefferson an account of his experiments on submarine firing, with drawings of his various plans. Mr. Jefferson expressed himself much pleased with this novel mode of maritime warfare, and assured Mr. Fulton that he would recommend it to the attention of government.

"It is curious to observe how Mr. Fulton's projects grew one out of another.

"The submarine guns gave rise to the steam man-of-war.

"It having been suggested by a distinguished naval officer, before alluded to, that in approaching an enemy so near as was necessary to give effect to submarine cannon, the vessel, if she was rigged in the ordinary way, would be liable to be entangled with her adversary; to meet this objection, Mr. Fulton proposed to move the vessel by steam. His reflections on this project, and what he saw of the performance of so large a vessel as the Fulton, her speed, and the facility with which she was managed, led him to conceive, that a vessel of war might be constructed, in which, to all the advantages possessed by those now in use, might be added the very important ones which she would derive from being propelled by steam as well as by the winds."

The character of Mr. Fulton is elucidated by an incident given thus in Colden's life of him:

"We must all remember how long, and how successfully, Redheffer had deluded the Pennsylvanians by his perpetual motion.

"Many men of ingenuity, learning, and science, had seen the machine: some had written on the subject; not a few of these were his zealous advocates; and others, though they were afraid to admit that he had made a discovery which violated what were believed to be the established laws of nature, appeared also afraid to deny what the incessant motion of his wheels and weights seemed to prove. These contrived ingenious theories, which were hardly less wonderful than the perpetual motion itself. They supposed that Redheffer had discovered a means of developing gradually some hidden power, which, though it could not give motion to his machine for ever, would keep it going for some period, which they did not pretend to determine.

"One of these perpetual motions commenced its career in this city* in eighteen hundred and thirteen. Mr. Fulton was a perfect unbeliever in Redheffer's discovery, and although hundreds were daily paying their dollar to see the wonder, Mr. Fulton could not be prevailed upon for some time to follow the crowd. After a few days, however, he was induced by some of his friends to visit the machine. It was in an isolated house in the suburbs of the city.

"In a very short time after Mr. Fulton had entered the room in which it was exhibited, he exclaimed, 'Why, this is a crank motion.' His ear enabled him to distinguish that the machine was moved by a crank, which always gives an unequal power, and therefore an unequal velocity in the course of each revolution: and a nice and practised ear may perceive that the sound is not uniform. If the machine had been kept in motion by what was its ostensible moving power, it must have had an equable rotary motion, and the sound would have been always the same.

"After some little conversation with the showman, Mr. Fulton did not hesitate to declare that the machine was an imposition, and to tell the gentleman that he was an impostor.

"Notwithstanding the anger and bluster which these charges excited, he assured the company that the thing was a cheat, and that if they would support him in the attempt, he would detect it at the risk of paying any penalty if he failed.

"Having obtained the assent of all who were present, he began by knocking away some very thin light pieces of lath, which appeared to be no part of the machinery, but to go from the frame of the machine to the wall of the room, merely to keep the corner posts of the machine steady.

"It was found that a catgut string was led through one of these laths and the frame of the machine to the head of the upright shaft of a principal wheel; that the catgut was conducted through the wall, and along the floors of the second story, to a back cock-loft, at a distance of a number of yards from the room which contained the machine, and there was found the moving power. This was a poor old wretch, with an immense beard, and all the appearance of having suffered a long imprisonment; who, when they broke in upon him, was unconscious of what had happened below, and who, while he was seated on a stool, gnawing a crust, was with one hand turning a crank.

"The proprietor of the perpetual motion soon disappeared. The mob demolished his machine, the destruction of which immediately put a stop to that which had been, for so long a time, and to so much profit, exhibited in Philadelphia."

In the year 1806, Mr. Fulton married Miss Harriet Livingston, daughter of Walter Livingston, Esq. One son and three daughters were the fruit of his marriage. In 1815 Mr. Fulton was examined as a witness in a steamboat cause, at Trenton.

"When he was crossing the Hudson to return to his house and family, the river was very full of ice, which occasioned his being several hours on the water in a very severe day. Mr. Fulton had not a constitution to

* New-York.

encounter such exposure, and upon his return he found himself much indisposed from the effects of it. He had at that time great anxiety about the steam-frigate; and after confining himself for a few days, when he was convalescent, he went to give his superintendence to the artificers employed about her: he forgot his debilitated state of health in the interest he took in what was doing on the frigate, and was a long time, in a bad day, exposed to the weather on her decks. He soon found the effects of this imprudence. His indisposition returned upon him with such violence as to confine him to his bed. His disorder increased, and on the twenty-fourth day of February, eighteen hundred and fifteen, terminated his valuable life.

"It was not known that Mr. Fulton's illness was dangerous till a very short time before his death, which was unexpected by his friends, and still more so by the community. As soon as it was known, all means were taken to testify, publicly, the universal regret at his loss, and respect for his memory. The newspapers that announced the event, had those marks of mourning which are usual in our country when they notice the death of public characters. The corporation of our city, the different literary institutions, and other societies, assembled, and passed resolutions expressing their estimation of his worth, and regret at his loss. They also determined to attend his funeral, and that the members should wear badges of mourning for a certain time.

"As soon as the legislature, which was then in session at Albany, heard of the death of Mr. Fulton, they expressed their participation in the general sentiment by resolving that the members of both houses should wear mourning for some weeks.

"This is the only instance we believe of such public testimonials of regret, esteem, and respect, being offered on the death of a private citizen, who never held any office, and was only distinguished by his virtues, his genius, and the employment of his talents.

"He was buried on the 25th day of February, 1815. His corpse was attended from his last residence, (No. 1 State street,) by all the officers of the national and state governments then in the city, by the magistracy, the common council, a number of societies, and a greater number of citizens than had been collected on any similar occasion. From the time the procession began to move, till it arrived at Trinity Church, minute guns were fired from the steam-frigate and the West Battery. His body, in a leaden coffin, covered with plain mahogany, on which is a metal plate engraved with his name and age, is deposited in a vault belonging to the Livingston family."

As a painter Mr. Fulton does not rank high. Probably his best picture is the portrait of his friend Barlow. We owe to him the splendid edition of Barlow's Columbiad. Mr. Colden says:

"The elegant plates which adorn that work were executed under the superintendence and advice of Mr. Fulton. He paid about five thousand dollars for the paintings, the plates, and letter press, which gave him a property in the publication. He relinquished, by his will, all his right to the widow of Mr. Barlow, with the reservation of fifty of the proof and embellished copies of the work. It was printed in Philadelphia, in quarto, and published in 1807; it is dedicated by Mr. Barlow to Mr. Fulton, in such terms as evince the strong attachment which subsisted between these men of genius. The original paintings, from which the prints of the Columbiad were engraven, form a part of the handsome collection which Mr. Fulton has left to his family."

We owe to him the introduction into this country of the pictures painted by his friend and master, West, from Lear and Hamlet, for Boydell's Shakspeare. The Lear cost him two hundred and five guineas, and the Ophelia one hundred and twenty-five, at Boydell's sale. At the same time he purchased a fine picture by Raphael West, from "As you like it." West's pictures were painted for Boydell, and his great project failing, the government allowed his pictures to be disposed of by a lottery. Whether Fulton was an adventurer in this lottery, or purchased of the owner of a prize, we know not. That he did not purchase of the Royal Academy is certain, or at any sale of their pictures. My impression is that he was an adventurer in the lottery, and gained these paintings as a prize. The inaccuracy of one part of Mr. Colden's statement renders further inaccuracy probable.

He endeavored to persuade his countrymen to purchase such pictures of West's as were at the artist's disposal, and he wrote to the citizens of Philadelphia thus:

"I now have the pleasure to offer you a catalogue of the select works of Mr. West, and with it to present you the most extraordinary opportunity that ever was offered to the lovers of science. The catalogue referred to is a list of all Mr. West's productions, portraits excepted. No city ever had such a collection of admired works from the pencil of one man; and that man is your fellow-citizen. The price set on the collec-

tion is fifteen thousand pounds sterling, a sum inconsiderable when compared with the objects in view, and the advantages to be derived from it."

Mr. Fulton was six feet in height, slender in his form, easy and graceful in his deportment. His countenance was animated, and his eyes and forehead betokened genius and unconquerable ardor. He was a kind father, a fast friend, an enlightened philosopher, and a good republican. The arts of America are indebted to him much—but the science and happiness of the world more.

Thus far we have copied Mr. Dunlap's Memoir of Fulton. As there are several claimants for the honor of first introducing steam for navigating purposes, we shall present our readers with extracts from Mr. Bowie's pamphlet advocating Mr. Symington's views, and afterwards insert portions of an article in Chambers' Edinburgh Journal, stating that to Mr. Taylor, the schoolfellow and associate of Mr. Symington, the honor belongs. Mr. Bowie, in reply to the article in Chambers' Journal, says:

A very cursory perusal will show its utter worthlessness, and even to the veriest tyro in mechanics, render its folly and presumption apparent.

The letter and extract, with Mr. Symington's signature appended, can be explained in a manner any thing but creditable to the reputation of Taylor; and the assertion that he superintended the construction of the engine is at variance with the fact admitted, that it was upon the same principle as one for which Mr. Symington had previously procured a patent. Besides, Taylor has still further shown that he was unfit for the office of superintending the construction of the engine alluded to, by the absurd declaration that Mr. Symington in his invention had thrown off the air pump.

Notwithstanding the hollowness of Taylor's pretensions, and notwithstanding Mr. Goulbourn's refusal to allow Mr. Symington's manly petition for parliamentary investigation, as to the justice of his claims, to be presented, the relatives or friends of the former individual,—described as an *amateur* by Captain Basil Hall,—have succeeded, by "*stealthy steps*" and secret influence, in obtaining for his widow a "*surreptitious*" pension from government of fifty pounds per annum. Surely such a glaring act of injustice and misappropriation of the public money deserves the reprobation of every honorable and well constituted mind.

[From Bowie's Narrative.]

William Symington was a native of Leadhills, county of Lanark, Scotland. While receiving an education to qualify him for the Church, an early predilection for mechanical philosophy led him to abandon his theological studies, and pursue with ardor those connected with his favorite science. His genius soon attracted the notice and secured the patronage of Gilbert Meason, Esq. then connected with the Wanlock Head lead mines. Before completing his twenty-first year, Mr. Symington had made several improvements on the steam engine; and, having protected them by His Majesty's Royal Letters Patent, constructed and introduced engines on his principle into different parts of England and Scotland.

As early as the year 1784, amidst the wild bleak scenery of the country he inhabited, and when he knew nothing of any attempts which might have been made to realize such an idea, it occurred to him that steam might be rendered available for the propulsion of locomotive carriages. He immediately set about embodying his idea; and, in 1786, submitted to the inspection of the professors and other scientific gentlemen in Edinburgh, a working model of a steam carriage, which afforded such proofs of capability, that he was warmly urged by all present to carry his invention into full effect.

While the model was in Edinburgh, Patrick Miller, Esq., of Dalswinton, who had heard of it from Mr. James Taylor, tutor in his family, who had been a schoolfellow of Mr. Symington, called at Mr. Meason's, and having minutely inspected it, expressed himself highly pleased with the construction and performance. In the course of conversation, Mr. Miller mentioned that he had spent much time in making experiments, for the propelling of vessels upon water by wheels, instead of sails or oars: and that they had been put in motion by applying manual strength to turning a handle or winch. He also said he had attempted to work them by the power of horses; as he had heard something of the same kind had been accomplished, even by means of oxen, in America. It occurred to Mr. Symington, and he stated his opinion to Mr. Miller, that a steam engine might be constructed which would propel a vessel, by communicating a rotatory motion to the paddles by the alternate action of two ratchet wheels, in the same manner as in the model of the steam carriage, then before them. Mr. Miller said he considered such a thing impracticable; and inquired how it would be possible to work such an engine on board, without setting the vessel on fire?

The description given of the model, and the manner in which it was intended to apply the power of steam, seemed to convince Mr. Miller of the practicability of the project: and he observed, that if Mr. Symington thought he could construct a steam engine, and work it with safety on board of a vessel, an experiment should be made, on a small scale, as soon as he, (Mr. Symington,) could possibly attend to it: and it was explicitly understood that the plan and construction of the engine, the mode of producing rotatory motion, and the means to be adopted for guarding against danger, were to be left entirely to Mr. Symington.

Soon after this, he proceeded to construct a small engine on a similar principle to one for which he had previously procured a patent. It was executed under his immediate inspection, and fitted on board a small double keeled vessel, lying upon a lake, near the House of Dalswinton. With this vessel a trial was made of the powers of the invention, in the autumn of 1788, in presence of Mr. Miller, and various persons of respectability; when the boat was propelled in so satisfactory a manner, that it was immediately determined to commence another experiment, upon a more extended scale.

In the month of October, 1789, a second exemplification* was afforded on the Forth and Clyde inland navigation, in presence of hundreds of spectators, who lined the banks of the canal, to witness what seemed so extraordinary an attempt; and who testified by acclamation their satisfaction at its result. Mr. Miller, Messrs. John Adam, of Blairadam, John Balfour, of Pilrig, Ambrose Tibbetts, members of the Carron Company, James Taylor, and David Drysdale, an experienced seaman, who took charge of the helm, were on board. The boat glided along, propelled at the rate of nearly six miles an hour; and all parties interested declared their conviction of the success of the experiment.

After an interval of ten years, the late Thomas Lord Dundas, of Kerse, applied to Mr. Symington, and having alluded to his former experiments, expressed a wish that he would employ himself in constructing a vessel, capable of being propelled by the power of steam, and superseding the use of horses, in dragging vessels upon the Forth and Clyde canal; of which canal his lordship was an extensive proprietor. Accordingly, under the auspices of that intelligent nobleman, a series of experiments was commenced in January, 1801, and continued until April, 1803. The cost of these experiments somewhat exceeded £7,000; but they placed beyond the possibility of doubt the practicability of steam navigation.

Lord Dundas was so convinced of the efficiency of Mr. Symington's exemplification, that he requested a complete model of the steam engine and boat, (with a set of ice breakers attached,) should be made. This was done, and Mr. Symington proceeded to London and presented it to his lordship.

During the time that the boat lay at Bainsford, Henry Bell, of Glasgow, was frequently beheld inspecting it; and, in 1811, he, in conjunction with others, constructed the Comet steamboat, which in that year first plied upon the Clyde.

Much praise has been awarded to Bell for the introduction of steam navigation; but how far he deserves it, the following facts will elucidate: Notwithstanding the many opportunities he had enjoyed,—notwithstanding his having voyaged to America, to instruct, or to be instructed by, the celebrated Fulton,—the Comet was far inferior in her performance, even to Mr. Symington's second exemplification. When the Comet commenced her operations as a passage boat upon the Clyde, she possessed four insignificant paddle-wheels; and took nine hours to sail from Port Glasgow to Glasgow.

* * * * * * *

In concluding this narrative, it is but doing an act of justice, to place on record the principal intelligent and spirited individuals alluded to in the preface.

It has been shown that Mr. Meason proved a warm and zealous patron; that Mr. Miller afforded the means of bringing the invention into notice; and that Lord Dundas perseveringly aided to bring it to the perfection which it attained. But it has not been stated, although deserving of acknowledgment, that his lordship, during the remainder of his life, frequently and generously befriended Mr. Symington.

For Mr. Bruce, the celebrated Abyssinian traveller, Mr. Symington entertained the strongest attachment. Mr. Bruce was so sensible of his worth, that from the time they first became acquainted, until death put an end to their intimacy, they were almost inseparable. And it was supported in the arms of Mr. Symington, that he who had travelled so far, and encountered dangers so many, yielded up his spirit.

To Sir Ronald Ferguson, Sir George Clerk, Prof. Leslie, Messrs. Gilbert Laing Meason, and —— Jardine, engineer, Mr. Symington considered himself under deep

* These exemplifications exactly resembled each other, in every thing but magnitude.

obligations for the interest they took in his welfare; and to Mr. James Walker he owed the obtaining of a small donation from the London steamboat proprietors. The Messrs. Staintons, of Carron, were also kind and attentive to his interests; and Mr. Robert Wight, accountant, of Edinburgh, rendered him many acts of friendship, and much valuable assistance.

Mr, Symington during life ceased not to remember his benefactors, and it may, with truth, be said, whatever failings he may have possessed, ingratitude was not among the number.

We add the following corroborative testimony, including Judge Clerk's opinion when at the bar:

"Opinion of John Clerk, Esq., advocate, regarding William Symington's specification and patent for steamboats.

"1. I am of opinion there can be no well founded objection to the specification: it describes, in proper terms, the invention for which the patent was granted.

"2. The notice the patentee gives how the same is to be performed is by no means irrelative; but, on the contrary, is requisite and proper.

"3. If the proprietors, or builders of steamboats, refuse a reasonable compensation, the patentee is entitled to stop them by an interdict; but I would not advise that measure. He should rather bring an action of damages against them, for having invaded his privilege, and benefitted themselves by his invention.

(Signed) JOHN CLERK.

"Edinburgh, June 30, 1834."

"It is much to be regretted that there existed not enterprise enough at that time, in Scotland, to encourage the ingenious artisan to repeat his experiments on the Clyde. All the subsequent improvements, however, in steam navigation, may be fairly traced to Mr. Symington's attempt; and we cannot help thinking that he has a strong claim on the national gratitude. He is still alive, and we fear not in the most flourishing circumstances. Should the state decline rewarding such meritorious services, the opulent proprietors of steamboats might well evince their liberality and discernment, by bestowing on him some recompense."—[Article on steam navigation—Supplement to the Encyclopædia Britannica.]

"It is remarkable, also, that the unfortunate Symington, who has such claims to the original invention of the steamboat, had previously contrived a similar application for the propelling of carriages; and actually exhibited, in the year 1787,* in the house of Mr. Gilbert Meason, in Edinburgh, the first model of a steam carriage that was, perhaps, ever seen."—[Article on locomotive carriages—Quar. Rev., March, 1830, page 380.]

"Mr. Symington took out a patent for steamboats in the year 1801; and he has the undoubted merit of being the first person who applied the power of the steam engine to produce motion in vessels."—[Capt. Basil Hall's Travels in North America, Vol. 2, page 387.]

"The earliest successful application of steam appears to have been made on the Forth and Clyde inland navigation by Mr. Symington."—[E. Galloway on the Steam Engine.]

"Several attempts have been made to apply the force of steam to the purpose of propelling boats in canals; and there seems to be no reason to think the undertaking by any means liable to insuperable difficulties. Mr. Symington appears to have had considerable success; and the method that he has employed for making a communication between the piston and the water wheel is attended with many advantages."—[Journal of the Royal Institution of Great Britain, Vol. 1, 1802, p. 195.]

—

[From Chambers' Edinburgh Journal.]

The credit of the inestimable invention of applying steam to the purposes of navigation has now been claimed by so many pretenders, that we believe the public are at this moment as much puzzled to whom to assign the palm as they have all along been to penetrate the mystery of the authorship of Junius. Independent of the numerous claimants in our own country, our brethren on the other side of the Atlantic have not been slow to assert their title: but although it be true that the great and important results likely to accrue from the discovery were first fairly developed on the Hudson, we are perfectly prepared to show, that *there* certainly the idea did not originate; that it was altogether of British, or rather of Scottish origin; and from documents now in our possession, we have little doubt of being able to set this disputed question for ever at rest, to the satisfaction of the public, and to prove that to the individual whose name stands at the head of this memoir, the world is indebted for all the benefits they enjoy by means of that wonderful fabric, the Steamboat.

* And in 1786.

In 1787, Mr. Miller engaged in a sailing match with a party of gentlemen at Leith, in his double vessel, against a first-rate sailing wherry. Mr. Taylor was, of course, on board; and to this circumstance may be attributed the primary projection of applying the steam-engine to navigation. Mr. Miller's vessel won the day, and Mr. Taylor felt perfectly convinced of the efficiency of the *principle* by which it was wrought; but, having taken a spell at the wheels, he found the labor so excessive, that he told Mr. Miller, that, unless he could apply a more commanding power than that of men, the invention would be of little use. Mr. Miller acknowledged the justice of the observation, and requested the aid of his cogitations on the subject, adding, that the only other plan he himself could think of was the employment of the capstan. Mr. Taylor's thoughts forthwith became steadfastly directed to the subject; and after much reflection, and many conversations with his employer, he at last suggested the steam-engine. Mr. Miller started many objections on the score of the danger of fire, &c.; but at last, after great persuasion, and not until Mr. Taylor had demonstrated by drawings the practicability of connecting the engine with the wheels, he agreed to have a small engine built, and to give the plan a trial. Accordingly, on the family coming into Edinburgh for the winter, from Dalswinton, Mr. Taylor was requested to find out a proper engineer for the purpose; and a young acquaintance of his, named William Symington, employed at the lead mines at Wanlockhead, Dumfrieshire, and who had invented a new construction of the steam-engine, (by throwing off the air pump,) being at the time in Edinburgh for his education, he recommended and introduced him to Mr. Miller. It was then agreed that the experiment should be made on the lake at Dalswinton, in the ensuing summer, (1788.)* In the autumn, Symington was sent for to Dalswinton to put the parts together, and fit the engine upon the vessel, a handsome double pleasure-boat. The experiment which followed succeeded perfectly; the vessel moving at the rate of five miles an hour, notwithstanding the smallness of the cylinders, which were only five inches in diameter. This trial took place in presence of hundreds of people, and an account of it, drawn up by Mr. Taylor, was inserted in the Dumfries Journal the same month, (Oct.) It was also noticed in the Scots' Magazine of the following November.

In 1801 or 1802, Mr. Symington, who, up to this time, had never laid the shadow of a claim to Mr. Taylor's invention, induced Lord Dundas to employ him to fit up a vessel for the Forth and Clyde Canal Company. This was accordingly done, but when set a-working, the agitation of the water and consequent washing of the banks, which it caused, was so alarming, that the Company would not permit it to be used again, and it was laid up at Lock Sixteen. It happened that, at this period, Mr. Fulton, the American engineer, was travelling in Britain for information in the line of his profession, and, whilst visiting the Carron works, in company with Mr. Henry Bell, then a carpenter at Glasgow, first heard of the steamboat. He forthwith applied to Mr. Symington, who resided in Falkirk, for leave to inspect the boat, which was immediately complied with, and every information readily furnished. The consequence was, that both Mr. Fulton and Mr. Bell immediately conceived the project of separately turning the invention to their own account. Mr. Fulton launched his first boat on the Hudson in 1807, and he and his country claimed the merit of the invention. Mr. Bell was somewhat tardier in his movements, and it was not until 1812 that his first steam-vessel, the Comet, was set a-going on the Clyde—when he, like Mr. Fulton, also claimed the merit of the invention. In the mean time it appears that Mr. Symington, too, not only laid pretensions to it, but had secretly taken out a patent so far back as the year 1802 or 1803. This stealthy step, however, of which neither Mr. Taylor nor Mr. Miller had the slightest suspicion, serving him nothing: for when he raised an action of damages upon it in 1815, against the proprietors of the Clyde steamboats, they defended themselves successfully on the plea that he was not the original inventor. Mr. Symington's unfair and continued interference, and the discovery of the surreptitious patent, of which Mr. Taylor was not made aware, until long afterwards, and not until many years after Mr. Miller's death, seem to have called forth an indignant remonstrance from Mr. Taylor, as we find by a letter of Mr. Symington, dated February, 1821, evidently intended to soothe his irritation, and promising to pay him one-half of the interest and proceeds of the patent.

Very shortly after Mr. Taylor's decease, application was made to the government, by one of his relatives, on behalf of his widow and family, in which some pretensions, brought forward at the time by Mr. Symington, in a letter to the editor of the Edinburgh Evening Courant, were most satisfac-

* Referred to at page 164, vol. iv.

A.V. 20 3 253199 L. & C. 20 6224-B

torily refuted. In this communication to government, also, a letter was quoted, penned so far back as the year 1787, by Mr. Symington to Mr. Taylor, in which that gentleman so explicitly acknowledges the originality of the conception of the applicability of the steam engine to the purposes of navigation, as belonging to the subject of this memoir, that it seems altogether incomprehensible how he could ever afterwards presume to attempt the appropriation of it to himself. An extract from this letter of Mr. Symington, as well as of his promissory epistle to Mr. Taylor, of February, 1821, is subjoined; and it is thought proper here to state, that the originals of these, as well as of many other communications between the parties on the same subject, have been submitted to the inspection of one of the editors of this publication. Mr. Symington subsequently attempted to renew his pretensions in a communication to the editor of the Ayr Advertiser; but these were so thoroughly set at rest by a respondent in the same publication, that it is unnecessary here to allude to them more particularly.

"I must make some remarks on your summer's invention, which, if made to perform what its author gives it out for, will undoubtedly be one of the greatest wonders hitherto presented to the world, besides being of considerable emolument to the projector. Great success to you, although overturning my schemes; but take care we do not come upon your back, and run away with them by some improvement. Your brother John gives a kind of credit to your report, which, for some reasons, I did not discourage. I must conclude, &c. &c.

(Signed) WM. SYMINGTON."

"Sir,—In terms of our former agreement, when making experiments of sailing by the steam engine, I hereby bind and oblige myself to convey to you, by a regular assignation, the one-half of the interest and proceeds of the patent taken by me upon that invention, when an opportunity occurs of executing the deed, and when required. I am, Sir, your obedient servant, (Signed) WM. SYMINGTON.

"To Mr. James Taylor, Cumnock."

For further information respecting Mr. Taylor's claims to be the inventor, see page 164, vol. iv., of the Mechanics' Magazine.

NOTT'S PATENT BAKERS.—We have examined this new invention for the kitchen, and cannot but conclude that it will answer a valuable purpose. It consists of a tin box, nearly three feet long, about 18 inches deep and wide, in the centre, and gradually diminishing in width towards each end, which is circular. Within about two inches of each end is a furnace, consisting of a sheet iron tube, four inches in diameter, similar to stove pipe, passing perpendicularly through the box, with a grate at the bottom, and a pan to receive the ashes, and a damper at the top to regulate the draught and heat. Large wire rods are passed horizontally through the box, on which materials for baking are placed, and fires made in the furnaces with charcoal. The heat from the iron tubes is reflected by the inner surface of the box, and the process of baking goes on with great uniformity and rapidity. Persons in this village, who have tested this Baker thoroughly, say that two quarts of coal will bake twelve pounds of meat and a peck of potatoes; and that one dollar's worth of common charcoal is sufficient to bake all the provisions of an ordinary family for a year. A great saving of firewood and expense is clearly exhibited by this fact. The Baker is portable, weighing but a few pounds, and can be put in the most convenient place for use. They are manufactured by Messrs. P. &. H. Hatch, of this village, who have the exclusive right of making and vending them in this and Orange county; and are sold for $5. In the summer season, especially, this Baker must be a valuable article for every housekeeper, and ensure a great saving of labor and fuel.—[Vermont Courier.]

EXTRAORDINARY IMPROVEMENTS IN INDIAN RUBBER.—The singular properties of Caoutchouc, or Indian Rubber, which some few years since was used only for the insignificant purpose of rubbing out the pencil marks upon paper, is now being introduced into numerous varieties of articles of dress, &c. Experiments are now going on by order of the Admiralty on board his Majesty's ship Excellent, at Portsmouth, upon guns, breachings, &c., (which are quite satisfactory,) their elastic quality saving the jerk of the recoil of the gun. The experiments have been made, and are continuing with 68-pounder long guns, and 32-pounder carronades. For stoppers for cables, and preventing the dragging of the anchor, or the breaking of the cable and hawser ropes, it will be invaluable. For the invention, we are indebted to Mr. Seivier, whose various scientific acquirements are well known and appreciated. The importation of Caoutchouc now amounts to some hundred tons annually, and so great is the demand for that article, that some of the West India planters are planting their estates with the tree, (Havea guianensis,) which is a species of fig, in order that they may be prepared to meet the increased demand. The tree being carefully cultivated, of course will much improve the quality of the Caoutchouc. The manner in which the patent elastic rope is manufactured is by cutting the India rubber into long strands, and placing them strand and strand with the hemp yarn; they are thus twisted together: when finished, by the application of heat the caoutchouc collapses, and, by that means, the rope is rendered elastic.—[English paper.]

THE *Mechanics' Magazine and Register of Inventions and Improvements* is published by the Proprietors, D. K. MINOR and J. E. CHALLIS, at No. 35 Wall street, New-York: in *weekly* sheets of 16 pages, at 6¼ cents—in monthly parts of 64 pages, at 25 cents—in volumes of 384 pages, in cloth boards, at $1.75—or at $3 per annum, *in advance*.—JOHN KNIGHT, (formerly proprietor of the London Mechanics' Magazine,) Editor.